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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/631,892	08/04/2000	Joseph D. Lichtenhan	38559-257945(6565-03)	1993

7590

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EXAMINER

ROBERTSON, JEFFREY

ART UNIT

PAPER NUMBER

1712

DATE MAILED: 07/03/2002

15

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/631,892

Applicant(s)

LICHTENHAN ET AL.

Examiner

Jeffrey B. Robertson

Art Unit

1712

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 April 2002 and 13 May 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 8-120, 122, 128 and 134 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 59-66, 70, 71, 86-92, 116, 118 and 128 is/are allowed.
- 6) ☒ Claim(s) 8-12, 14-20, 29, 32-37, 39-41, 43-58, 67-69, 72-85, 93-105, 107-113, 115, 117, 120 and 122 is/are rejected.
- 7) ☒ Claim(s) 13, 21-32, 38, 42, 53-55, 67-69, 73-85, 93-96, 100, 101, 106, 110, 114, 119 and 134 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_.
- 4) ☒ Interview Summary (PTO-413) Paper No(s). 15.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☒ Other: See Continuation Sheet.

Continuation of Attachment(s) 6). Other: notice of copied papers used, decision of request under 37 CFR 1.48(a).

## DETAILED ACTION

### *Response to Amendment*

✓ 1. The amendment submitted 5/13/02 is objected to because the amendment to page 2 of the specification deletes subject matter in lines 8-9, "heteroleptic POSS nanostructures and functionalized heteroleptic POSS nanostructures", without indicating that any change was made in the marked-up copy. In the amendment to page 9, in line 2, "Poss" should be in all capital letters. In addition, the amendment to page 9, fails to incorporate the changes made to the specification in the preliminary amendment filed 7/17/01 to the structures of lines 5 and 11 on page 9. In the amendment to page 11, line 27, the amendment fails to incorporate the changes made by the preliminary amendment of 7/17/01 to the formula on page 11, line 29. In the amendment to claim 8, at the end of line 9, the "s" of "compounds" runs into the "d". The spacing should be corrected. In claim 8, line 8, claim 73, line 13, claim 86, lines 8 and 9, claim 99, lines 3 and 4, and claim 128, line 1, the spacing of the subscripts in formulas should be corrected as the subscripts run into the element symbols or parentheses.

### *Claim Objections*

✓ 2. Claim ~~134~~ is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. For claim 134, claim 99 sets forth a process of rearranging a structure of a compound, which necessarily means

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that the compound is converted to an isomer of the same compound. Therefore, claim 134 is not further limiting.

3. Claims 22-32, 40-42, 53-55, 67-69, 73-85, 93-96, 99-113, and 119 are objected to because of the following informalities: For claims 22, 73, and 99, there should be a space between "the" and "formula". For claims 29, 40, 53, 67, 80, 93, and 108, organometallics is spelled incorrectly.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 73-85, 117, and 120 are rejected under 35 U.S.C. 112, first paragraph.

For claims 73-85, and 117, the specification, while being enabling for POSS fragments as defined on page 13 of the specification, does not reasonably provide enablement for POSS fragments of the formula  $(\text{RSiO}_{1.5})_m(\text{RXSiO}_{1.0})_n$  being reacted with nanostructure compounds to provide expanded nanostructure compounds. For claim 120, the specification, while being enabling for X being equal to functionalities, does not reasonably provide enablement for R and R' being equal to functionalities. On page 7, lines 8-9, X is defined as a functionality, but R is defined as an organic group. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 15-17, 20, 29, 32, 40, 45-58, 67-69, 72, 80-82, 85, 93-98, 100, 101, 108-111, 113, and 115 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

For claim 46, the difference between the POSS fragment and the POSS compound is not understood, because according to the claim, they may both have the same formula.

For claims 15, 20, 29, 32, 40, 45, 53, 58, 67, 72, 80, 85, 93, 98, 108, 113, are the definitions of R and X the same as given in claims 8, 22, 33, 46, 59, 73, 86, and 99?

For claim 97, there is a lack of antecedent basis for the term "polymeric silsesquioxanes" because neither claim 97 nor claim 86 set forth the term polymeric silsesquioxanes.

For claims 100 and 101, how are compounds not containing R, X, or R' groups rearranged into compounds containing those groups. For example, how are silicate nanostructure compounds rearranged into compounds containing R and R' groups?

#### ***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 120 and 122 are rejected under 35 U.S.C. 102(b) as being anticipated by Lichtenham et al. (U.S. Patent No. 5,484,867).

For claims 120 and 122, Lichtenham teaches in column 5, lines 35-65, a polyhedral oligomeric silsesquioxane of the formula  $[(\text{RSiO}_{1.5})_4(\text{RXSiO}_{1.0})_3]_{\Sigma 7}$ , where  $\text{X}=\text{OA}$ ,  $\text{A}=\text{H}$  and  $\text{R}$  is an organic group. This formula falls within the structure,  $[(\text{RSiO}_{1.5})_m(\text{RXSiO}_{1.0})_n]_{\Sigma \#}$ , claimed in claim 120, and the formula  $[(\text{RSiO}_{1.5})_m(\text{RXSiO}_{1.0})_n]$  claimed in 122.

10. Claims are rejected under 35 U.S.C. 102(b) as being anticipated by Marsmann et al. (Polyhedron Journal article).

For claims 8 and 99, Marsmann teaches on page 3357, in the abstract that silsesquioxanes of the formula  $\text{R}_8(\text{SiO}_{1.5})_8$  are rearranged to give POSS of the formula  $\text{R}_{10}(\text{SiO}_{1.5})_{10}$  and  $\text{R}_{12}(\text{SiO}_{1.5})_{12}$ . For claims 120 and 122, as shown in Figure 1 on page 3358, Marsmann teaches that the POSS produced are nanostructure compounds. For claim 33, on page 3358, in the paragraph bridging columns 1 and 2, Marsmann teaches that two differently substituted organo-octa-silsesquioxanes reacted together produce heteroleptic species, as evidenced by Figure 4, page 3360. In Figure 4, Marsmann discloses that  $\text{R}=\text{ClC}_3\text{H}_6-$  and  $\text{R}'=\text{NCSC}_3\text{H}_6-$ . For claims 8, 15, 33, 40, 99, and 108, in Table 1, on page 3359, Marsmann teaches that a solvent such as acetone or acetonitrile is used, as well as base catalysts such as sodium hydroxide.

For claims 9-12, 16, 34-37, 41, 102-105, and 109 on page 3361, at in the paragraph bridging columns 1 and 2, Marsmann teaches a basic procedure for the cage rearrangement where the starting silsesquioxane is mixed with the catalyst and brought to reflux, cooled and isolated through extraction. Here, Marsmann teaches that the amount of hydroxide base is 5.4 equivalents per mole of silicon present in the reaction mixture.

For claims 14, 39, and 107, as evidenced by structures II and III in Figure 1, a Si-O-Si must be broken in order for a POSS of the formula  $R_{10}(SiO_{1.5})_{10}$  to be produced from  $R_8(SiO_{1.5})_8$ .

For claims 18, 43, and 111, in Table 1 on page 3359, entry b., Marsmann teaches that a mixture of bases is used.

For claims 19, 20, 44, 45, 112, and 113, in entry c. of Table 1, Marsmann teaches a co-reagent NaF, which is an alkali halide.

### ***Response to Arguments***

Applicant's arguments filed 4/5/02 have been fully considered but they are not persuasive. For claim 46, applicant argues that it is clearly recited that the resulting POSS fragments are expanded fragments. The examiner finds no such recitation in claim 46. For claims 15, 20, 29, 32, 40, 45, 53, 58, 67, 72, 80, 85, 93, 98, 108, 113, applicant has not clarified the definition of the R and X groups as requested in the previous office action.

For claim 97, applicant states that the claim was amended to correct the antecedent basis problem, however, this was not done. Applicant did not address the

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rejection of claims 100 and 101 in the previous office action and repeated above regarding the rearrangement of the compounds.

For claims 120 and 122, the Lichtenham patent still reads on the general formulas as set forth in the claims as set forth above. The deletion of the specific structure formula  $[(\text{RSiO}_{1.5})_4(\text{RXSiO}_{1.0})_3]_{\Sigma 7}$  does not prevent the claims from reading on the Lichtenham patent.

***Allowable Subject Matter***

11. Claims 80-82, and 85 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, first and second paragraph, and the claim objections set forth in this Office action.

12. Claims 73-79, 83, and 84 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, first paragraph, and the claim objections set forth in this Office action.

13. Claims 29, 32, 53-55, 67-69, and 93-96 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, and the claim objections set forth in this Office action.

14. Claims 17, 100, 101, 110, 115 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

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15. Claim 117 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, first paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

16. Claims 46-52, 56-58, 72, 97, and 98 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.

17. Claims 42, 100, 101, 106, 110, 119, and 134 would be allowable if rewritten to overcome the claim objections set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

18. Claims 22-28, 30, and 31 would be allowable if rewritten or amended to overcome the claim objections set forth in this Office action.

19. Claims 13, 21, 38, and 114 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

20. Claims 59-66, 70, 71, 86-92, 116, 118, and 128 are allowed.


21. The following is a statement of reasons for the indication of allowable subject matter: none of the cited references teaches or suggests a method of preparing functionalized POSS nanostructure compounds, a method of converting a first functionalized POSS into a second functionalized POSS, the use of water to wash the POSS nanostructure compounds, or the use of THF, MIK, or toluene as solvents

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey B. Robertson whose telephone number is (703) 306-5929. The examiner can normally be reached on Mon-Fri 7:00-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert A. Dawson can be reached on (703) 308-2340. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

JBR   
June 20, 2002



UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND  
DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE  
WASHINGTON, D.C. 20231  
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Part of Paper No.15

In re application of	:	
Lichtenhan et al.	:	DECISION ON
Serial No. 09/631,892	:	REQUEST UNDER
Filed: August 4, 2000	:	37 CFR 1.48(a)
For: PROCESS FOR THE FORMATION OF	:	
POLYMERIC OLIGOMERIC SILSESQUOXANES	:	

This is a response to the added Consent of Assignee and statement of added inventor, filed May 29, 2002 to the original REQUEST FOR CORRECTION OF INVENTORSHIP UNDER 37 C.F.R. § 1.48(a), filed November 20, 2001. The request is that Qibo Liu be added as an inventor in the instant application.

37 CFR 1.48(a) requires that the request to correct the inventorship be accompanied by: (1) a statement from each person being added and from each person being deleted as an inventor that the error occurred without deceptive intention on his or her part; (2) an oath or declaration by each actual inventor or inventors as required by 37 CFR 1.63 or as permitted by 37 CFR 1.42, 1.43 or 1.47; (3) the fee set forth in 37 CFR 1.17 (i); and (4) the written consent of any existing assignee, if any of the originally named inventors has executed an assignment.

The added documents have met these requirements. Therefore, the request is granted. The record of this application will be corrected to reflect the addition of Qibo Liu as an inventor.

The Request is **GRANTED**.

A handwritten signature in cursive script, reading "Robert A. Dawson".

Robert A. Dawson  
Supervisory Patent Examiner  
Technology Center 1700